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Advancing Time Management Training: from Pre-Primary to Adult Education

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Abstract. Increase of time management effect is in permanent focus in social sciences, e.g. education, economics, political science, international relations, etc. For the increase of time management effect, education provides time management training in educational institutions at all levels. This work's aim is to shape a framework for time management training in educational institutions starting from pre-primary school moving through higher education and further to adult education. Exploratory research of qualitative nature is leveraged. Exploratory research is rooted in interdisciplinary methodology. Analysis of theoretical sources with open access is based on concept review. The finding is that there are several time concepts built on a variety of constructs by different scientific disciplines. Time concepts developed in social sciences can be used among these social sciences. The concept of research constructs allows finding a novel way for grouping of different interdisciplinary approaches applied to time into the external and internal ones. This helps mold four methodologies for time management. Benefits and drawbacks of each methodology are highlighted. Four methodologies are designed to target gradually and sequentially specific needs of individuals in time management training.

Keywords: external time; framework; internal time; methodology of time management; time; time management; time management training.

Introduction

Increase of time management effect is in the permanent focus in social sciences, e.g. education, economics, political science, international relations, etc.

For the speed up of the achievement of a desired result, time management is a decisive factor. Social sciences link time management with organization effectiveness (Ziekye, 2016), job performance (Ahmad et al., 2012), productivity (Maket & Njeru, 2023), work-life balance (Easya & Susanty, 2022), and well-being (Young et al., 2024). However, analysis of available scientific literature reveals that the dissonance between the social time, e.g. organization

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effectiveness and job performance, and individual time, e.g. work-life balance, in time management persist (Ahrens et. al., 2024a).

For the increase of the time management effect, education plays the decisive role by providing time management training in educational institutions at all levels. Against this background, time management, being of interdisciplinary nature, is distributed among such educational subjects as mathematics, physics, philosophy, biology, and others in an unsystematic manner. Such approach to time management training makes difficult for individuals to address the dissonance between their social time and their individual time. Thereby, the present research is motivated by the intention to search for a solution to cope with individuals' dissonance related to their social and individual time.

The main aim of this work is to shape a framework for time management training in educational institutions starting from pre-primary school moving through higher education and further to adult education. It should be noted that framework means the specific viewpoint is meant (Ahrens & Zaščerinska, 2014).

The significance of this work lies in the development of a framework for the increase of efficiency of training in time management aimed at the achievement of a desired result. The importance of the current work is supported by the overview of modern time definitions which are often omitted by researchers who work in the field of time management. The overview is based on the novel concept of research constructs that are also compared with SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. This work is crucial as it shows the innovative way for grouping of different interdisciplinary approaches applied to time analysis into the external and internal ones. In previously carried out research, external and internal time is presented only from the perspective of one scientific discipline, e.g. biological (Daan et. al., 2002) or computer science (Fetzer & Cristian, 1997). This work proposes four methodologies to target specific needs of individuals in training of time management. All these contributions will help increase individuals' time management skills in a personalized way targeted to speed up the achievement of a desired result.

This work is based on concept review followed by theoretical modelling of four methodologies for the advancement of time management training.

Materials and Methods

The current work is enabled by the following research questions:
- What time concepts relevant to time management exist?
- What training methodologies can be molded by existing time concepts?

As time concepts have hardly been compared in previously published works, the present work is exploratory. An important feature of exploratory research and exploratory studies is in its emphasis on perspective (Edgar & Manz, 2017). Exploratory research and studies observe specific phenomena to look for patterns and arrive at a general theory of behaviour (Edgar & Manz, 2017).

Current exploratory research is interdisciplinary. Interdisciplinary research means that time concepts are searched in each separate scientific discipline. As there is a general lacuna of time concepts in social sciences, the interdisciplinary research is beneficial for collecting and comparing time concepts found in each separate scientific discipline. Interdisciplinary research facilitates the elaboration of a common understanding of time concepts.

The desired result of this exploratory research, namely theoretical modelling of training methodologies for time management, supposes the use of a qualitative methodology (Ismoilova, 2020). Qualitative methodology of exploratory research in this work starts with the analysis of theoretical sources with open access via google search. Google search has an advantage in the search of theoretical sources with open access as google search offers all available search

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results, belonging to different sciences, on the under-explored topic of time concepts. Table 1 presents inclusion and exclusion criteria for selecting theoretical sources to be selected for analysis.

Table 1. **Criteria for inclusion and exclusion of theoretical sources for analysis** *(the authors)*

Inclusion criteria	Exclusion criteria
Theoretical sources have to contain a theoretical time concept	No empirical studies are taken into consideration
Time concepts have to be relevant to time management training	Research and studies that focus exclusively on time management methods and techniques are not analyzed
Construct has to relate to the time definition (notion and structure), model, feature, factor, or condition	Benefits, advantages, and disadvantages of use of time are not reviewed

The present work is defined as concept review. "Concept" in this work has two meanings. First, concept review means that the researchers look for time concepts and review them. Second meaning is that the researchers propose their own framework or concept – research constructs – for the evaluation and interpretation of results on time concepts found in theoretical sources.

Theoretical analysis (Ahrens et al., 2023a) is used for the evaluation and interpretation of results found in theoretical sources. Meanings emerge from the interpretation (Zaščerinska et.al., 2021). Theoretical modelling (Ahrens et al., 2019; Ahrens et al., 2023b) is applied to frame methodologies in time management. Comparative analysis of methodologies in time management training (Ahrens et al., 2023a) helps identify the impact of existing time concepts on time management theories, models, methods, and techniques. Summarizing analysis (Ahrens et al., 2023c) illuminates essential contents in a short and precise text (Mayring, 2004).

Results

Time management in social sciences is hardly explained with underlying time theories and concepts as well as frameworks. In scientific works devoted to time management, theoretical analysis is often started with the explanation what time management is, e.g. Molaee et.al., 2014; and Francis-Smythe, 2006. This makes difficult to enhance time management theories, models, methods, and techniques with relevant scientific findings and research results aimed at achieving a greater impact on management processes.

One of the reasons, why time management lacks theoretical underpinning with time concepts, is that time is an interdisciplinary category (Mandel, 2012). Each scientific discipline uses its own approaches to time. For example, biology uses a biological approach to time, mathematics - mathematical, etc. Among many, there are such scientific approaches to time as relational, static, dynamic, objective historical, social and individual, biological, physical, psychological time, conditioned-reflex readout of intervals, visceral sensitivity, concept of a course of life, individual stories of the person, and some other (Mandel, 2012).

The following section provides the description of existing time concepts and frames methodologies for time management training.

Existing Time Concepts Relevant to Time Management:

Analysis of existing time concepts is started with the understanding what a concept means. For purposes of this exploratory work, a concept is defined as a verbal abstraction drawn from observation of a number of specific cases (Watt & van den Berg, 2002). Based on this concept definition, time concept, as the research phenomenon, is decomposed into research elements or constructs. It is worth mentioning that a research construct is an abstraction that

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researchers use to represent a phenomenon that is being examined or studied (Jansen, 2023; Pedada, 2023). In comparison, scientific constructs are mainly related to hypothetical types of constructs (Wilson, 2001). Constructs play a fundamental role in advancing knowledge across numerous disciplines, including psychology, sociology, economics, and education (Pedada, 2023). They enable researchers to investigate complex phenomena, identify relationships between variables, and establish theoretical frameworks that contribute to a deeper understanding of the world around us (Pedada, 2023). Research elements related to time concept are time definition, model, feature, factor, or condition. Decomposition is based on existing experience in social and humanitarian sciences (Žogla & Lasmanis, 2009) of researchers who carry out the current work (Ahrens et.al., 2018). Table 2 summarizes the search results of time concepts.

*Table 2. **Summary of time concepts** (the authors)*

Construct	Theoretical analysis results	Reference
Definition (notion, structure, and process)	Time is a qualitative and quantitative measure of duration of different objects, e.g. physical, cultural, social and other objects	Ahrens et.al., 2024a
	Individual, social, and historical time	Mandel, 2012
	External time and internal time	Daan & Merrow, 2002
	Links between the external and internal time	Ahrens et.al., 2024a
	Non-return	Ahrens et.al., 2024a
	Linear (past, present and future)	Yabe & Yamada, 2023
	Cyclic (seasons, years, weeks, days, etc)	Ahrens et.al., 2024a
Model	Computational models of time perception	Maniadakis & Trahanias, 2014
	Cognitive models exploiting sense of time	
Feature	Non-renewable	Ahrens et.al., 2024a
	Smoothly flowing or jerky, compressed or stretched, empty or saturated	Mandel, 2012
Factor	Performance, satisfaction, and stress	Claessens et.al. 2007
	Well-being	Aeon et.al. 2021
Condition	The use of time is not an aim in itself and cannot be pursued in isolation	Claessens et.al. 2007

Our analysis shows that analysis of what time is attracts a lot of attention across scientific disciplines. However, there is no universal definition of time notion. A scientific discipline aligns time notion to its field of investigation. For example, time can be defined as a philosophical, mathematical or educational category (Ahrens et.al., 2024), or a physical measurement result. Interestingly, time as philosophical and mathematical categories are not related to time as physics category.

Published research reveals that time is structured into the external time and the internal time (Daan & Merrow, 2002). Social and historical time refers to the external time, and individual time is linked with the internal time (Ahrens et.al., 2024a). Further on, the external time and the internal time are inter-connected (Ahrens et.al., 2024a).

Procedural aspects of time are described as non-return (Ahrens et.al., 2024a), linear (past, present and future) (Yabe & Yamada, 2023), and cyclic (seasons, years, weeks, days, etc) (Ahrens et.al., 2024a). Procedures related to time make it a crucial resource in life of individuals, companies, and states. Time used in a good manner can bring an individual or a company to success. And opposite, poor time management can lead to a disappointment.

Time features can be divided into objective (e.g. non-renewable) (Ahrens et.al., 2024a) or subjective (fast, stretching, smooth, jerky, etc) (Mandel, 2012).

Existing computational implementations of intrinsic interval timing model are not yet coupled with other cognitive or behavioural capacities within a broader functional context, and

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in that sense, the internal clock remains unaffected by outside processes (Maniadakis & Trahanias, 2014; Ravichandran-Schmidt, 2023). Cognitive models exploiting sense of time imply mental time travel, time in decision making, representation of duration, etc. (Maniadakis & Trahanias, 2014). Cognitive models are beneficial for medical (e.g. forgetting) as well as educational (learning) purposes.

Time is a factor that influences performance, satisfaction, or stress (Claessens et.al., 2007), or well-being (Aeon et.al., 2021).

In time management, the use of time is not an aim in itself and cannot be pursued in isolation (Claessens et.al., 2007).

Our finding is that there are several time concepts built on a variety of constructs by different scientific disciplines. Time concepts developed in social sciences can be used among these social sciences. For example, time concept formulated in the educational science can be applied to sociology or philosophy.

Time Management Training Methodologies

Time management in social sciences deals with societies, communities, and individuals. Time structure divides time into external (social) and internal (individual) (Ahrens et.al., 2024a). Social time implies working time, working days, holidays, vacations, etc. Internal time refers to biological time, inner (internal) clock, and circadian rhythm (Ahrens et.al., 2024a). It should be pointed that the idea of external and internal time is not new. However, previous research differentiated external and internal time only within the scope of one scientific discipline, e.g. biological (Daan et. al., 2002) or computer science (Fetzer & Cristian, 1997), etc. The inter-connections between society and individuals as well as external and internal time allow shaping methodologies in time management training.

By methodology, the rationale and procedures of time management training implementation is meant (Ahrens et.al. 2024b). The rationale explains the key mechanism of time management training (Žogla, 2018).

Based on the links between societies and individuals as well as external and internal time, four methodologies applicable to time management training are molded. Table 3 presents these four methodologies.

Table 3. **Time management training methodologies** *(the authors)*

Methodology	Rationale	Key criteria
Internal approach	Focus on an individual's behavior	Individual's distress
External approach	Focus on individua's performance	Individual's productivity
External-internal balance	Focus on individual's work-life balance	Individual's job satisfaction
The system of the external-internal approaches	Focus on individual's life	Individual's life satisfaction

The internal approach to time management training supports individuals with planning their own time. If time management is well organized, it helps individuals to decrease the stress they experience in their work and life. Common models of time management training based on the internal approach are represented by ABC (Awareness, Belief, Continuation) Model of Time Management, Covey's Time Management Grid and Eishenhower Matrix (important, not important, urgent, not urgent), Mind Map, and Pickle Jar Theory (Jinalee & Singh, 2018).

The external approach means that individuals adapt to their working time organized by their companies for the increase of individuals' productivity. An increase in individuals' productivity is built by states' regulations on pension age, length of a working day, vacations, etc. In turn, companies could allow hybrid working conditions (a mix of in-office and remote work) (Grzegorczyk et.al., 2023). For the implementation of this approach, individuals might

leverage Pareto Principle, or ALPEN (A= Activities, L= Length, P= Planning, E= Establishing priorities, N= Next Day) method (Jinalee & Singh, 2018).

The external-internal balance can be described by individuals' search for work-life balance. Individuals might wish to evaluate their satisfaction with their job: whether the job fits to their requirements, or whether job is beneficial, or stress level in job is satisfactory, etc. For this, individuals could implement Mind Map, Parallel Programming Model, or Pickle Jar Theory (Jinalee & Singh, 2018).

The system of the external-internal approaches implies that individuals develop a sense of meaning in life (Feather & Bond, 1983). For this, individuals could wish to explore how time management relates to having a sense of purpose (Heintzelman & King, 2019).

Comparative analysis of each of four methodologies in time management training allows emphasizing that all four methodologies have benefits and drawback. Their interpretation depends on the context. For example, if employee prefers the internal approach to his/her time management, e.g. often sick leaves, often non-paid vacations, etc, this can be beneficial for this employee but a disappointment for the company. The prevalence of the external approach to time management in a company might lead to employees' overtime work and similar issues. The methodology of the external-internal balance can lead to employees' anxiety in chasing work-life balance (Onque, 2024). The methodology of the system of the external-internal approaches allows employees to build their own links between their internal and external time. It means that an employee manages his/her time in a sustainable manner (Zaščerinska, 2011).

Our finding is the identification of four methodologies in time management training. The methodologies propose the rationale behind each of them as well as key criteria. Each methodology is illustrated by several models of time management. Each methodology is described by its benefits and drawbacks.

Discussion

Many researchers acknowledge that time is difficult to define. Specifically, it refers to the definition of time notion. Already in ancient times, Greek thinkers Heraclitus, Plato, Archimedes tried to explain the essence of time. Still in modern life, the time phenomenon attracts a lot of research efforts to increase time understanding. For better understanding what time is, it is important to analyse time theories and concepts in a consequent manner: starting with the ideas recorded in ancient times through Middle Ages and until present moment.

Analysis of published works, e.g. Molaee et.al., 2014; and Francis-Smythe, 2006, leads to the conclusion that researchers avoid revealing a time definition. They start their analysis with determining what time management is. Such way of the research implementation does not allow deriving to a novel view on an approach to time management.

The authors of this contribution express their belief that the research constructs - time definition (notion, structure, and procedural aspects), model, feature, factor, or condition – provided in this work are helpful for social sciences to elaborate a better definition of time to be useful for many researchers from social sciences. The experience of the authors of this contribution allows finding that identified research constructs can be used for the phenomenon analysis in any of social sciences. For example, management and political sciences widely use SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. Table 4 shows the comparison of SWOT analysis with the research constructs presented in this work.

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*Table 4. **Comparison of SWOT analysis elements with the research constructs** (the authors)*

SWOT elements	Relevant research construct
Strengths	Definition (notion, structure, and procedural aspects)
Weaknesses	Factors and conditions
Opportunities	Model, feature, and conditions
Threats	Factors

These constructs might be helpful to direct researchers' attention to specific details related to time description. Interdisciplinary efforts on a more specific description of time on the basis of research elements or constructs could increase our common understanding of the time phenomenon. The enhanced definition of time is crucial as time remains an important resource in management and other social sciences.

The use of research constructs in this work helped systematize a variety of approaches, such as social, individual, biological, psychological and others, applied to time analysis. This variety of different approaches is grouped as external and internal approaches. The external approach includes social, historical, cultural time and similar while the internal approach encompasses biological and psychological time, inner clock, circadian rhythm and similar. Our finding is in accordance with the need in more research that focuses on the internal and external variables that affect time management outcomes (Aeon et. al., 2021). Grouping of approaches into the external and internal ones allows molding four methodologies for time management training – the internal approach, the external approach, the external-internal balance, and the system of the external-internal approaches. Presented methodologies for time management training intend to help organize one's time in order to speed up the achievement of a desired social or individual result. Each methodology can be monitored via a relevant key criterion - individual's distress, individual's productivity, individual's job satisfaction, and individual's life satisfaction. These criteria are also shown in Table 3. The methodologies for time management training can be implemented separately from each other or as a unity for the gradual increase of individuals' time management skills. Table 5 proposes the sequential use of the methodologies in training and education.

*Table 5. **Sequential use of the methodologies in training and education** (the authors)*

Methodology	Educational level
Internal approach	Primary education
External approach	Basic and secondary education
External-internal balance	Vocational education
The system of the external-internal approaches	Higher and adult education

The proposed methodologies can be used in a similar way when providing training for the advancement of employees' time management skills.

Implementation of further research could focus on validation of proposed methodologies of time management training.

Conclusions

The present work provides an overview of time concepts. The review of time concepts is based on the analysis of research constructs. The concept of research constructs allows finding a novel way for grouping of different interdisciplinary approaches applied to time into the external and internal ones. This in turn helps mold four methodologies for time management training. Benefits and drawbacks of each methodology are highlighted. The four methodologies

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intend to target gradually and sequentially specific needs of individuals in time management training.

It should we noted that this research is subject to research limitations. A limitation is the development of a theoretical framework for time management training. Therefore, the validation of the presented framework and its features, benefits, and drawbacks is included in the following studies.

The principal conclusion of this research is that the enhancement of time management theories, models, methods, and techniques starts with the examination of scientific developments related to each element of the key phenomenon "time management": a researcher has to analyze "time" and/or "management" separately. Analysis of the whole phenomenon "time management" does not allow identifying qualitative changes in each research element that impact the advancement of time management training. Another principal conclusion is the use of interdisciplinary research. Interdisciplinary research helps identify and compare new scientific developments in different scientific disciplines on the same phenomenon. These comparisons may shape a new framework or perspective on a phenomenon studied by different scientific disciplines and elaboration of a common framework or approach to be applied to the phenomenon.

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